SCIENCE.

FRIDAY, FEBRUARY 13, 1885.

COMMENT AND CRITICISM.

THE COMMITTEE on the government surveys having at this writing not yet made its report to congress, it may be worth while to consider a recommendation which touches upon the subject, made by the secretary of the navy in his last report, repeated indeed from former reports of the same official. It is to the effect that the work of the revenue marine, the lighthouse board, and the coast survey, so far as the latter is concerned with marine investigations, should be brought, with that of the hydrographic office, under the direction of the navy department, "whereby greater unity of purpose and consistency of action would be secured."

It can hardly be questioned that the change thus proposed might be economical in preventing the duplication of outfits, and that it might open much practical and profitable work to naval officers; but, apart from the better general scheme of the national academy, there is, perhaps, an element of difficulty in this plan, that might be used against it. The execution of certain technical parts of hydrographic work requires special skill; and, if the demand for this skill were supplied only by those who have made the navy their life-career, it might not be so well satisfied as if supplied from a larger circle. Moreover, the experience needed for the best performance of certain duties can be gained only by years of perseverance; and, when gained, the country cannot afford to lose it by its possessor being ordered off on a long cruise, as is at present the fashion in naval routine.

It may be seen that these disadvantages do not appear in the present organization of either the geological survey or the coast survey, for their recruits are drawn from all sources. They are not first asked, if, above every thing else, they are naval or military men, but rather if they are geologists or topographers; and, further, whoever gains successful experience in these services, gains also a relatively permanent occupation in his specialty. Perhaps it is in part for these reasons that the committee of the national academy did not include in its recommendations the suggestions found in the report of the secretary of the navy.

But all things considered, there seems to be sound reason in the policy of the secretary, "that the officers and seamen of the navy should be employed to perform all the work of the national government upon, or in direct connection with, the ocean." An arrangement by which the geodetic and geological surveys occupy themselves with our land possessions, while a bureau in the navy department determines what we need to know of the ocean and its shores, does not seem irrational. It would involve, of course, certain changes in the departments in the direction indicated by the possible element of difficulty above named. It is absolutely essential to the success of such a policy, that the scientific naval bureau which it requires, should not be, except in its subordinate offices, a training-school for naval officers. Its work must be directed, and for the greater part carried on, by men permanently employed for their special tasks, as is the case in the coast and geological surveys. Without this, there would be little gain of economy or uniformity, and matters would far better rest as they now are. If the change were made, there would be much outcry in certain quarters, and perhaps, for a time, some injustice hardly separable from so considerable a revolution; but these difficulties would be only of a personal and temporary nature, and not inherent in the case. Once accomplished, we should look back with wonder on the present strange order

of things in which our navy is intrusted with the exploration of the deeper seas and the mapping of far distant coasts, while it is held unfit to survey the shallower waters of our own shores.

There is probably no other subject in which practice lags so far behind knowledge as it does in the teaching of small children, and especially in country schools. The latest appliances in electrical apparatus are no sooner invented and tested, than they are brought into use, and supersede what were good appliances yesterday; but the antiquated way of teaching arithmetic and reading is still almost universal, in spite of its having been proved again and again that they can be taught by a scientific method in half the time. It was a witty Spaniard who said that the reason English-speaking people are so illogical, is that they have to learn to spell when they are young. The wonder daily grows that their instruction in arithmetic does not wholly destroy what residue of reason their spelling has left behind. A marked and much-needed change was brought about in England by the Association for the improvement of bread-making; and there is no doubt, that, by a vigorous associated effort, — by holding public meetings, by distributing pamphlets, and by all the usual means of agitation, — something might be done to awaken school-committee men and superintendents to some sense of responsibility. There is no better field for the missionary energy of those persons whose first interest is in the maimed and tortured of their own country.

Meantime the Society to encourage study at home could do no better work than to offer a course in pedagogics to primary-school teachers. The teachers of country schools are often intelligent, and eager to learn; but it would be asking too much to expect each one to discover for herself methods of teaching that have only been perfected by many generations of experience. To put them in the way of reading a few inspiring books on the subject would often be to work a transformation in them. This suggestion is made by the circular of information in regard to rural schools, recently sent out by the Bureau of education. That circular itself, if it were widely distributed, would do a great deal of good by means of the model lessons in arithmetic which it reprints from the report of the Massachusetts board of education. They must be in the nature of a revelation to most untrained teachers. It is a pity that the compiler of the circular could not find an equally good and explicit description of the modern art of teaching how to read.

LETTERS TO THE EDITOR.

The relation of form to time of maturity in esculent roots.

Many facts seem to indicate that a direct relation exists between the form of esculent roots and their time of maturity in the different varieties of the same species.

In the spring of 1883 a few typical roots of the 'long hollow crown' and 'Carter's new Maltese' parsnip were set out for seed in the garden of the New-York agricultural experiment-station, with other roots selected from each of these varieties, which were short and thick, approaching to napiform. As the flower-stalks developed, those from the short, thick roots in both of the varieties were considerably earlier in blooming than the longer typical roots. This unexpected event recalled the fact that the 'round' or 'turnip-rooted' parsnip is earlier in developing its root than the long varieties; also that in the 'Egyptian' and 'eclipse' beets, the earliest two varieties, and the 'French forcing' carrot, the earliest of its kind, the roots are shorter in proportion to their length than in other varieties.

Printed descriptions[1] from the most careful writers upon vegetables indicate that a similar relation exists in the onion and turnip. Thus in the onion the axial diameter in nineteen so-called varieties is noted as less than the transverse diameter. Of these, five are called 'very early,' five are called 'early,' seven 'half early,' one 'rather early,' and one 'rather late.' In seven so-called varieties, in which the axial diameter equals or exceeds the transverse diameter, five are called 'late,' one 'not early,' and one 'early.'

In addition to these, in which the dimensions are given in figures, the 'brown Teneriffe' is described as being 'very flat,' and, with one exception, is called 'earliest of all.' The 'intermediate red Wethersfield' is described as flattened, and the 'two bladed' as 'flat.' Both of these are called 'early.' The 'early white silver-skinned' onion is described as 'about the same diameter as the Nocera, but thicker' (through the axis), and is said to be 'a little less early than the Nocera.' The 'white Portugal' is noted as "a little less flat than the Nocera or 'early

[1] The descriptions examined are from Burr's Field and garden vegetables of America, and from Les plantes potagères of Vilmorin, Andrieux, et Cie.

white silver-skinned;' it is also a little less early." It may be noted, further, that the Messrs. Landreth of Philadelphia declare their 'extra early Bloomsdale pearl,' which is remarkably flattened in form to be the earliest of all onions.

In twenty so-called varieties of the turnip, the axial diameter is noted as less than, or equal to, the transverse diameter. Of these, one is called 'very early,' nine are called 'early,' one is called 'rather early,' and five are called 'half early.' In fourteen varieties the axial distance is noted as greater than the transverse diameter. Of these, one is called 'late,' one 'a little late,' one 'medium,' five are called 'half early,' three 'rather early,' and three 'early.' The 'rouge plat de mai de Munich,' described as being 'very much flattened,' is said to be 'unquestionably the earliest of turnips.' The 'rouge de Milan,' called 'very flat,' is pronounced 'one of the earliest.' In the majority of the long-rooted turnips the season of maturity is not noted, — a fact in itself suggestive; for the more depressed forms would hardly be noted as 'early,' if they were not earlier than others.

It may be objected to this hypothesis, that a root or bulb that grows in a round or flattened form would naturally sooner acquire the requisite size for table use than one that grows long and slender, and that this fact alone is not sufficient to indicate a physiological relation between the form of the root and its time of maturity. The time of the first bloom, and the first ripe seed in different varieties, mark definite stages of development, which, we may assume, are less dependent upon the influence of selection. If, therefore, we find that the time of bloom and of seed maturity bear a relation to the form of the root, we have additional evidence in favor of our hypothesis. We have gathered from records of the station such data as bear upon the point, with the results noted in the following table:—

	No. of varieties.	Average days to first bloom.	Average days to first ripe seed.
Radish (1883).			
Turnip-rooted	6	$57\frac{1}{3}$	$116\frac{1}{3}$
Long-rooted	7	$57\frac{6}{7}$	$123\frac{2}{3}$
Radish (1884).			
Round, or turnip-rooted	22	$60\frac{7}{16}$	108
Long-rooted	22	63	$112\frac{1}{2}$
Beet (1883).			
Turnip-rooted	3	$57\frac{2}{3}$	112
Long-rooted	1	59	116
Carrot (1883).			
Short-rooted	2	52	119
Long-rooted	1	69	122

In the radishes, those have been called 'long-rooted' in which the axial diameter exceeded the transverse diameter. In the beet and carrot the division was necessarily more arbitrary, but the shortest-rooted varieties were called respectively 'turnip-shaped' and 'short.' It is evident that the figures given in the table sustain the hypothesis, so far as they go. Observations made in the station garden upon many varieties of beet, carrot, onion, radish, and parsnip, indicate, that, in general terms, the degree of earliness is proportionate to the degree of 'flatness' of the root, though exceptions are not very uncommon.

Should further evidence establish this hypothesis, we have a valuable guide for selection in producing new varieties. We may not only hope to increase our earlier varieties by selecting the more flattened roots; but by rendering the roots of the earliest long varieties short through selection, or possibly through influence of cross-fertilization, we may reasonably hope to secure earlier varieties than have as yet been obtained. For example: the 'early long scarlet' radish, though it has a long slender root, is scarcely less early than the 'early scarlet turnip-rooted.' It would appear, therefore, that in this variety we have a parent for an earlier radish than is at present known. The roots of this variety vary considerably in thickness as compared with the length. By selecting for seed through a series of generations the roots having the greatest proportional diameter, we may hope to promote earliness. Experiments in this line are already in progress at our station.

EMMETT S. GOFF.
N. Y. agricultural experiment-station.

Domes mounted on cannon-balls.

The chief objection urged against the mounting of rotatory domes on cannon-balls is the difficulty experienced in keeping the balls at equal distances apart. If the dome is much used, this objection becomes a serious one; and no dome so large that it would require more than four balls should be mounted in this manner. If the sill and the bed-plate of the dome are so well built that they retain their figure sensibly perfectly, and the track is kept thoroughly clean, the balls will ordinarily not be found to change their relative position very much, except during the winter season. At this time of the year, and under favorable conditions of temperature, the fine snow which is often driven into the observatory, underneath the dome, will, if allowed to remain in the track, form an icy coating over the balls as they pass through it, no matter what the weight of the dome may be. Under such conditions, if the dome is forcibly moved, the incrusted ball will often change its relative position several feet, thereby perhaps imperilling the safety of the dome.

DAVID P. TODD.

A NEW PLAN FOR THE SCIENTIFIC ASSOCIATIONS OF BOSTON.

A SHORT time ago we referred to the difficulty of obtaining a reasonable attendance at the meetings of scientific societies in Boston, and found one obstacle to be the comparative infrequency with which our scientific men come into general contact with one another and with the public. To-day we propose one external remedy, which may serve in time to better this state of things by multiplying the opportunities, and so increasing the chances of contact. By it we believe that not only science, but the whole community, will be the gainer.

Our plan consists in the concentration of the principal scholarly institutions of the city in a

quarter most readily reached from the suburbs, where most of the members reside. Apart from Cambridge, the members are far more largely distributed, than elsewhere, along the lines of the two railways which have their stations in the 'Back-Bay' district; and this region will be directly entered by the new bridge which is to connect Cambridge with Boston. The Massachusetts institute of technology with its Society of arts, the Boston society of natural history, and the Medical school of Harvard college, are already there. Here, too, is the Museum of fine arts; and, most important of all, to it will shortly be removed the Public library. The square containing the Medical school and the site secured for the Public library has remaining upon it a vacant lot large enough for a building answering all probable needs, and seemingly reserved for this very purpose. It is not, however, the only available place.

Here, then, let us construct a fire-proof building of fair proportions and creditable aspect, having one long side, removed from the street, devoted to a well-lighted book-stack, and the rest to larger and smaller halls and offices. Each floor could be devoted to a single institution, with its portion of the book-stack to itself; or it might be shared by two or more smaller societies, which could choose whether they would economize their resources, — perhaps by placing their libraries under one administration, perhaps by occupying on successive evenings the same meeting-room, — or whether they would remain as independent as if in a separate building of their own. By relegating the larger part of its library to its share of the stack, each society, with its choicer books and its special appurtenances, could make its own apartment doubly as attractive as now. If feasible, a common periodical room could attract the readers of all the societies. Each story should be quickly accessible by an elevator. The rooms should be heated by steam, and every assembling-room have, in addition, an open fireplace.

Under this hospitable roof should be gathered, first of all, the American academy of arts and sciences. With its more than twenty thousand volumes, it has altogether outgrown its present illy ventilated gloomy quarters, and must, perforce, soon take its flight to roomier parts. Next, the Massachusetts historical society, the aged members of which have now to climb three flights of spiral staircase to attend a meeting, or consult a book, in a building soon likely to be taken from them by the city, and where its precious collections of some thirty thousand volumes are endangered by the immediate proximity of a theatre. Next, the collections of the Boston medical library association (fifteen thousand volumes), now including the library of the medical school, where nearness to this school would advantage all parties. Next, the library of the Boston society of natural history (some twenty-five thousand volumes), which has outgrown its present quarters, and which would be more useful in closer proximity to other libraries than in immediate relation to its museum: this, however, being already in that general vicinity, is less important for the plan. Finally, this building should accommodate, for meeting-room at least, if not also for their smaller libraries, other societies of kindred aim, some already quartered, others in search of an abiding-place, — the Society of arts, the Appalachian mountain club, the Boston society of architects, the American society for psychical research, the Boston branch of the Archaeological institute of America, the New-England meteorological society, etc.

Then there is a nameless unorganized scientific club in the city, which has monthly dinners here and there, and whose members come together merely to meet or to honor a guest from a distance. Could this be enlarged, organize, and have its headquarters in this building, it would give additional reason for adding a restaurant to the attractions of the place, where, from among the frequenters of these associated (but not amalgamated) libraries, from those who visit the Public library for research, from among the out-of-town instructors of the medical school and the technological institute, one would daily meet at luncheon or

at dinner some agreeable companion. A conversation-room could be added, and the place become a general rendezvous for scientific and literary men; and these rooms could be so arranged as to admit, on precious occasions, of being thrown together, so as to banquet a Huxley, a Helmholtz, or a Pasteur in a suitable place and manner.

If we look for a suitable name to give to the edifice which shall be the free home of the arts and sciences in Boston, what can better represent its local history, its exalted science, its 'divine' art, than the name of 'BOWDITCH'? 'Bowditch hall,' then, let it be; and let those in Boston, and they are many, who honor the sciences and love the arts, make this more than a name, and help the advancement of all these varied institutions at once by securing them a common and a fitting home. The societies can doubtless bear a part of the expense; but the plan is too large for them to carry out unaided, too fair to fail. What other plan could promise such solidarity of all high interests? What better fitted to restore the ancient prestige of Boston's name?

IS THERE A CORRELATION BETWEEN DEFECTS OF THE SENSES?

PEOPLE sometimes assume that a defect of any important sense is balanced to the individual by the increased perception of the remaining senses. For instance: it is often thought that deaf persons have better eyesight than those who hear, and that blind persons have better hearing than those who see. The returns of the tenth census of the United States (1880) concerning the defective classes show clearly the fallacy of such a belief. They indicate that the deaf are much more liable to blindness than the hearing, and the blind more liable to deafness than the seeing.

About one person in every thousand of the population is blind, and one in every fifteen hundred deaf and dumb. Now, if these proportions held good for the defective classes themselves, we should expect to find one in a thousand of the deaf-mute population blind, or one in fifteen hundred of the blind population deaf and dumb: in other words, we should expect to find no more than thirty-four blind deaf-mutes in the country; whereas, as a matter of fact, no less than four hundred and ninety-three blind deaf-mutes are returned in the census.

In the following table, I., I present an analysis of the doubly and trebly defective classes. The information has been compiled from the published statements of Rev. Fred. H. Wines (who had charge of the department of the census relating to the defective classes[1]), supplemented by unpublished information kindly furnished by the census office.

TABLE I.

Analysis of the defective classes as returned in the tenth census of the United States (1880).

Singly defective.		
Deaf and dumb[1]	30,995	
Blind	46,721	
Idiotic	73,370	
Insane	91,133	
Total singly defective		242,219
Doubly defective.		
Blind deaf-mutes	246	
Idiotic deaf-mutes	2,122	
Insane deaf-mutes	268	
Blind idiots	1,186	
Insane blind	528	
Total doubly defective		4,350
Trebly defective.		
Blind idiotic deaf-mutes	217	
Blind insane deaf-mutes	30	
Total trebly defective		247
Total defective population		246,816

[1] The 'deaf and dumb' have no other natural defect save that of deafness. They are simply persons who are deaf from childhood, and many of them are only 'hard of hearing.' They have no defect of the vocal organs to prevent them from speaking. A child who cannot hear our language with sufficient distinctness to imitate it remains dumb until specially instructed in the use of his vocal organs. In the above table, the 'deaf and dumb' are therefore classified with those having a single defect.

In the following tables, II.–VII., I have reduced these figures to percentages.

TABLE II.

Percentage of the population of the United States who are defective.

	Totals.	Percentage.
Deaf and dumb	33,878	0.0675
Blind	48,928	0.0975
Idiotic	76,895	0.1533
Insane	91,959	0.1833
Defective population	246,816	0.4921
Population not defective	49,908,967	99.5079
Total population	50,155,783	100.0000

[1] See *American annals of the deaf and dumb* for January, 1885.

TABLE III.

Percentage of the deaf-mute population who are otherwise defective.

	Totals.	Percentage.
Deaf-mutes returned as also blind	493	1.45
Deaf-mutes returned as also idiotic	2,339	6.90
Deaf-mutes returned as also insane	298	0.88
Deaf-mutes returned as otherwise defective	2,883	8.51
Deaf-mutes returned as simply deaf	30,995	91.49
Total deaf and dumb	33,878	100.00

TABLE IV.

Percentage of the blind population who are otherwise defective.

	Totals.	Percentage.
Blind persons returned as also deaf and dumb	493	1.01
Blind persons returned as also idiotic,	1,403	2.87
Blind persons returned as also insane,	558	1.14
Blind persons returned as otherwise defective	2,207	4.50
Blind persons returned as simply blind	46,721	95.49
Total blind	48,928	100.00

TABLE V.

Percentage of the idiotic population who are otherwise defective.

	Totals.	Percentage.
Idiots returned as also deaf and dumb,	2,339	3.04
Idiots returned as also blind	1,403	1.82
Idiots returned as otherwise defective,	3,525	4.58
Idiots returned as simply idiotic	73,370	95.42
Total idiots	76,895	100.00

TABLE VI.

Percentage of the insane population who are otherwise defective.

	Totals.	Percentage.
Insane persons returned as also deaf and dumb	298	0.32
Insane persons returned as also blind,	558	0.61
Insane persons returned as otherwise defective	826	0.90
Insane persons returned as simply insane	91,133	99.10
Total insane	91,959	100.00

TABLE VII.

Percentage of the doubly defective who are also trebly defective.

Of 493 blind deaf-mutes, 217, or 44.02 %, are returned as also idiotic.
Of 493 blind deaf-mutes, 30, or 6.09 %, are returned as also insane.
Of 2,339 idiotic deaf-mutes, 217, or 9.28 %, are returned as also blind.
Of 298 insane deaf-mutes, 30, or 10.07 %, are returned as also blind.
Of 1,403 blind idiots, 217, or 15.47 %, are returned as also deaf and dumb.
Of 558 insane blind persons, 30, or 5.38 %, are returned as also deaf and dumb.

The tables seem to indicate that in the case of deafness, blindness, idiocy, and insanity, some correlation exists; for persons having one of those defects appear more liable to the others than persons normally constituted, and doubly defective persons appear to be more liable to be otherwise defective than persons having a single defect. For instance: —

(*a*) Of 50,155,783 persons in the United States, 246,816, or 0.4921 %, are defective.
(*b*) Of 246,816 defective persons, 4,597, or 1.86 %, are doubly defective.
(*c*) Of 4,597 doubly defective persons, 247, or 5.37 %, are trebly defective.

The results obtained above, I think, merit the consideration of scientific men, and are calculated to throw light upon the subject of correlated defects.

Although the proportion of the insane who are deaf or blind is abnormally large, the evidences of a correlation between insanity and the other defects noted above are not well marked; but in regard to deafness, blindness, and idiocy, a marked correlation appears to exist.

1. *Deaf-mutes.* — There are fourteen and a half times as many blind persons among the deaf and dumb in proportion to the population as there are in the community at large, and forty-six times as many idiotic.

2. *Blind.* — There are fourteen times as many deaf-mutes among the blind in proportion to the population as there are in the community at large, and nineteen times as many idiots.

3. *Idiotic.* — There are forty-three times as many deaf-mutes among the idiotic in proportion to the population as there are in the community at large, and eighteen times as many blind.

The apparent correlation between deafness, blindness, and idiocy, may possibly indicate that in a certain proportion of cases these defects arise from a common cause, perhaps arrested development of the nervous system.

It is of course possible that some of the persons returned as 'blind deaf-mutes' may

have lost sight and hearing from the same disease. The returns have not yet been sufficiently analyzed to enable us even to separate the congenital from the adventitious cases. We cannot therefore tell at the present time how far the evidences of correlation may be weakened by a closer inspection of details.

The large number of deaf-mutes who have been classified as idiots, also suggests caution in accepting the returns. I recently met a young lady — one of the brightest and best pupils of the Illinois institution for the deaf and dumb — who commenced her school-life in an idiot-asylum. She was there discovered to be simply deaf, and was transferred to the Institution for the deaf and dumb at Jacksonville, where she not only received a good education, but was successfully taught to speak. Not only are children who are simply deaf, sometimes sent to idiot-schools; but idiotic children who hear perfectly are often sent to institutions for the deaf and dumb, when it becomes the painful duty of the principal to undeceive the parents as to the real condition of their child. The difficulty in distinguishing these two classes of defective persons arises from the absence of articulate speech. Children who are deaf from infancy, and idiots, do not naturally speak, but from very different causes. In the one case, the cause is lack of hearing; in the other, lack of intelligence. The judgment of unskilled persons regarding the intelligence of deaf-mutes should evidently be received with caution. It is only to be hoped that the number of idiotic deaf-mutes returned in the census has been over-estimated. Before accepting the results as thoroughly reliable, it would be well to know whether or not the persons who made the returns were competent to judge in the matter.

ALEXANDER GRAHAM BELL.

EARTHQUAKE OF JAN. 2, 1885.

THE daily papers of Jan. 3 contained reports of a slight earthquake in Maryland and Virginia the previous evening.

On Jan. 4 circulars of inquiry were sent to more than twenty places in the vicinity of the reported shock. The questions asked had reference to the time of the shock, its duration, number of shocks, character of accompanying noise, and intensity according to a given scale. It will be necessary here to quote only the first three of the six numbers of this proposed scale of intensity, which are as follows: —

No. 1. *Very light.* — Noticed by a few persons, but not generally felt.

No. 2. *Light.* — Felt by the majority of persons, rattling windows and crockery.

No. 3. *Moderate.* — Sufficient to set suspended objects (chandeliers, etc.) swinging, or to overthrow light objects.

In response to this circular, seventeen written reports, and a copy of the Leesburg *Mirror*, were received; and from these replies, together with reports in the New-York *Tribune* and in *Science*, a tabulated summary was prepared, and represented graphically upon the accompanying map, on which are marked all the places from which any report, either manuscript or press, was at hand.

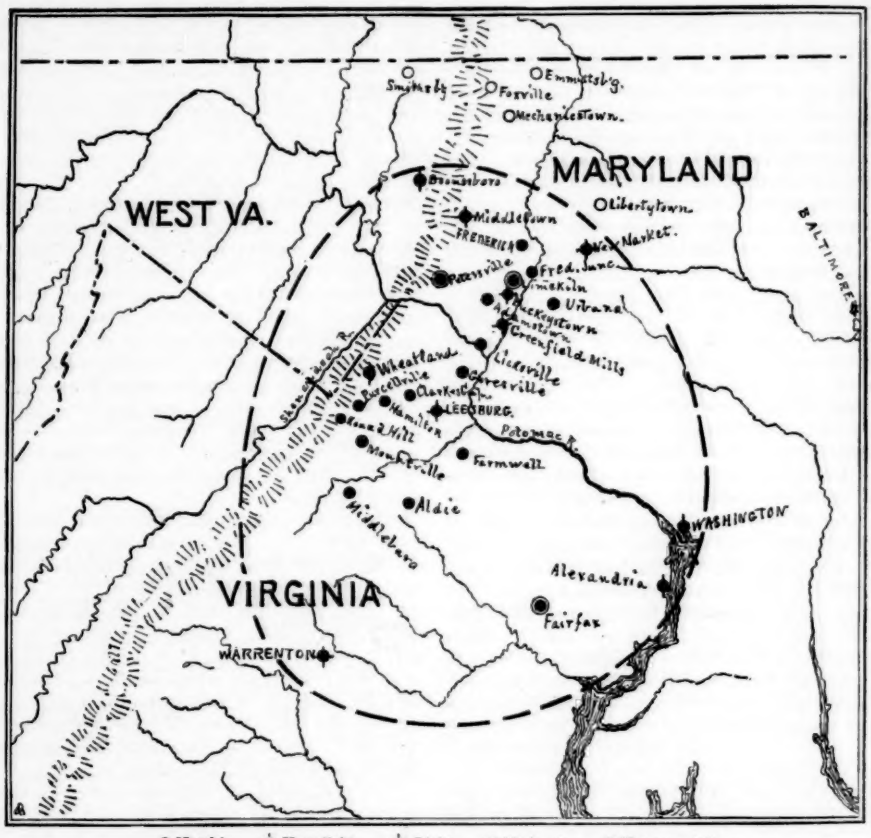
As is there shown, the northern boundary of the region affected is well determined by manuscript reports from five places lying beyond its limits. The inquiries, which might have determined its limits as clearly in other directions, failed to elicit any response. It appears to have extended very little, if at all, west of the mountains. The only direct report obtained from that region was from Boonesborough, Md., where it was felt *near*, but not *in*, the town. The Leesburg *Mirror* stated generally that it was felt in Jefferson county, W. Va., but no reply was received to circulars sent there.

The closest approximation to the true time is probably 21 h. 12.1 m. eastern time, as given by W. C. Winlock at Washington, D.C., with which agree also the reports of W. J. Grove at Lime Kiln, Md., and W. H. Routzahn at Middletown, Md. These are the only reports which vary from 21 h. 10 m. or 21 h. 15 m., except Fairfax, Va., which is 21 h. 5 m., and W. H. Dall at Washington, who gave 21 h. 16 m. At Adamstown, Md., two shocks were reported; and at Buckeystown, Md., a second very light shock at 21 h. 45 m.

The estimates of duration were, as usual, very discordant, varying all the way from three seconds to two minutes. As the tendency of ordinary observers is always to exaggerate this element, the unexpected and exciting nature of the phenomena making the time seem longer than it really is, probably ten or fifteen seconds would be a liberal estimate of the duration.

The noise accompanying the shock was compared to that made by a loaded wagon passing rapidly over frozen ground or over a bridge, to distant thunder, and to the roaring of a chimney on fire. In some cases persons went out of their houses to see if their chimneys were not burning.

The shock seems to have been most severe in the southern part of Frederick county, Md., where, at Petersville and Lime Kiln, it reached No. 3 of the proposed scale. At most places it did not exceed No. 2, and it is therefore called above a 'light' shock. There are some



○ Not felt. ● Very light. ⊕ Light. ◎ Moderate. ● Not reported.

EARTHQUAKE, JAN. 2, 1885, 9 H. 12 M., P.M.

indications, also, of a focus of increased intensity in the southern part of the area affected, as shown by the reports from Warrenton and Fairfax, Va., but no confirmation of these was obtained.

The limits of the shock and its intensity at various places, so far as reported, are indicated by appropriate symbols upon the map, to which the reader is referred.

C. G. Rockwood, Jun.

AMERICAN MILK.

Some interesting facts have come to light, during the investigations, by the U. S. agricultural bureau of chemistry, of the composition of milk. The object of the investigation is to determine by large numbers of analyses made under uniform conditions, and on samples from various sources, the average constituents of American milk. The work which has been done up to this time has been mostly of a local nature, but sufficiently extensive to give value to the results obtained.

The specific gravity of milk is 1.030. When the cream has been removed, this number is larger. Twelve samples of milk from Mr.

G. L. Higby gave an average specific gravity of 1.0295. Two samples of a Jersey cow's milk sent by the commissioner of agriculture marked 1.033. The milk from Mr. W. Blair, of a cow fed principally on ensilage, twenty-two samples, gave specific gravity 1.0318; same cow fed 'chop food,' fifteen analyses, 1.310. It is a very common practice to remove the cream, and then add water until the milk is reduced to its original density. For this reason the use of the lactometer for determining the purity of milk may lead to serious error. It is also true that perfectly genuine milk may vary greatly in density. The first of the milking is always poorer in cream, and therefore denser, than the last. Unless, therefore, the conditions under which the sample of milk is obtained are known, the number expressing its density is not conclusive in respect to its genuineness.

The volume of cream which a given milk will afford depends on many conditions. Transportation, shape of vessel, temperature, and time allowed for cream to rise, are the chief causes which affect the cream volume. A remarkable decrease in the volume of cream has also been noticed in milk samples purchased in open market. Thirteen samples bought in open market showed a percentage of cream of seven. Thirty-four samples bought of the dairyman, and known to be genuine, gave fifteen per cent of cream by volume. This curious phenomenon will certainly be of interest to milk-buyers.

The fat in a milk is not always in proportion to the volumetric percentage of cream: therefore the determination of the fat (ether extract) gives a better index of the butter-making value of the milk than is afforded by the volume of the cream alone. In a hundred and seven analyses the average percentage of fat was nearly five.

The sugar is the most constant constituent of milk. Over two hundred analyses show an average percentage of sugar of milk of four and six-tenths. Its determination optically is quick and accurate. It is the safest single criterion by which to judge of the purity of the sample.

The caseine of milk is composed of several albuminoids. No attempt at separation of these bodies has been made. The average percentage of albumens in American milks is markedly less than in those of other countries. In the analyses made, the average per cent is nearly three and a half. These analyses show that the milks of the United States are better adapted for butter than for cheese making. They are characterized in general by a large percentage of fat and sugar, and a lower content of albumen, than the milks of Europe. It is the intention of the bureau to extend these analyses so as to determine the localities of the country where the best milks are produced, to note the influence of change of season on the composition of the milk, and to carefully study the characteristics of the milk of different breeds of cows, and the influence of various foods thereon.

Much of the value of analytical work on milk which is done in this country is lost on account of the many different methods of analysis employed. These different methods render it impossible to compare the work of various analysts. The bureau hopes also, by a patient trial of all the most approved methods, to be able to unite the analysts of the country on that procedure which a large experience may pronounce the best. H. W. WILEY.

NOTICE OF SOME RECENTLY DISCOVERED EFFIGY MOUNDS.

So few earthworks resembling animals in their shape are known beyond the limits of Wisconsin, that I send you an account of several which I have discovered during the past two seasons, the majority of which are situated south of St. Paul, twenty-five of them being in this state.

In the diagrams accompanying this article, I have shown the outlines of a few of the most interesting of these Minnesota effigy mounds, and here give a short description of each, with its surroundings. They are all reduced to the same scale, 1 : 500.

No. 1 is situated near the village of La Crescent, and probably represents a frog. Its greatest length is ninety-eight feet. The body is two feet high, and the head eighteen inches. Near it is a bird-effigy; and within a quarter of a mile there are five other bird-effigies, with sixty-nine round mounds and embankments. The frog is on a terrace about fifty feet above the Mississippi River; and part of the mounds are on the lower terrace, which is about thirty feet above the river.

No. 2 is on the town site of Hokah. It is situated on a terrace some seventy feet above Root River. From the extremity of the snout to the tip of the tail, its length in a right line is just sixty-two feet and a half, and the body is a foot and a half in height. There are two bird-effigies on a terrace some ten feet below this one. Formerly there existed sev-

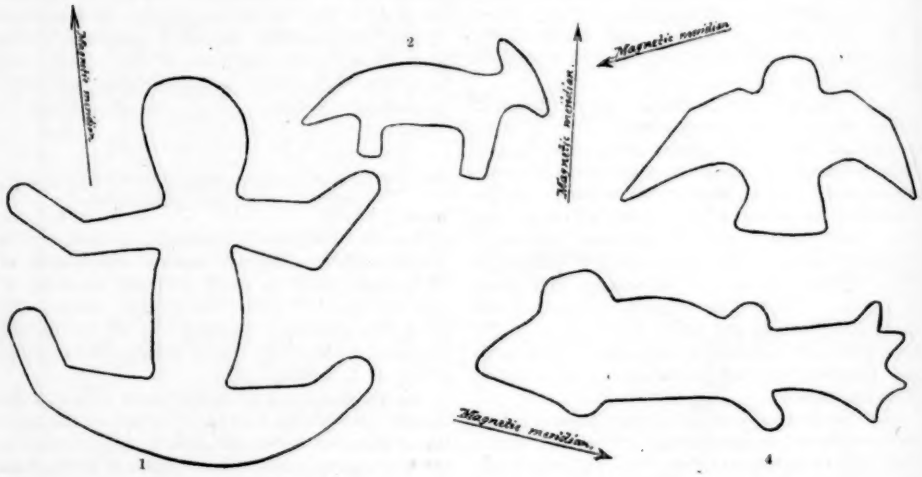
eral other effigies, and thirty or forty mounds and embankments, on the same terrace with the birds, which have been removed in grading streets and lots.

No. 3 is near Richmond Station, on a terrace about twenty-four feet above the river. It is seventy-six feet in an air line from tip to tip of the wings; and the body, with head and tail, is forty-four feet in length. The body, to the first joint of the wings, is fifteen inches in height. Formerly a number of ordinary mounds existed in the immediate vicinity of this effigy.

No. 4 is situated near the village of Dakota, upon a terrace about thirty feet above the river, and is in the midst of nineteen ordinary mounds. Its length is a hundred and ten feet, and the centre of the head is two feet and a half in height. It undoubtedly represents a fish. This is the first case that has been discovered of a fish with fins.

In the limited territory hitherto examined by me in south-western Wisconsin, it would seem, from the numerous ruined effigies, that there formerly existed hundreds of such works. Judge Gale of Galesville estimated that there were fully one thousand effigies in the southern part of Trempeleau county alone; and, from my own observations, I should say a like estimate for Vernon and Crawford counties would be rather under than over the truth. Taking Judge Gale's estimate for Trempeleau county, and reducing it one-half, there would still remain more effigies in the one county than can be enumerated from all the published surveys together.

The effigies surveyed by myself, in addition to the twenty-five in Minnesota, are one in Iowa, and ninety-six in Wisconsin, — a total of a hundred and twenty-two to the present time. On critically examining their delineations, very important differences in class and style from those farther east, portrayed in Lapham's work, are discernible; so that one is irresistibly drawn to the inference, that, before generalizations of value can be made, ten times the number of facts now recorded must be gathered together. Unfortunately, however,



that fell destroyer of antiquities, the plough, annually narrows our field of research.

In conclusion, something might be said on the question of the relation between any relics contained in this class of mounds and their shapes. The fact is, however, that little, if any thing, has been understandingly done with a view to ascertain their contents. The few effigies opened along the Mississippi have shown relics and forms of interment similar to those of the common burial-mounds of their neighborhood.

T. H. Lewis.

RICHET ON MENTAL SUGGESTION.

In the *Revue philosophique* for December, Mr. Richet gives an account of some experiments in mental suggestion, and attempts to estimate their value by means of the theory of probabilities. Men-

tal suggestion is Richet's contribution towards the task of naming the new phenomenon which is just now struggling for recognition, and which has been hitherto variously designated as 'thought-transference,' 'mind-reading,' and 'telepathy.' 'Thought-transference,' it strikes us, is the worst of these names, and 'telepathy' the best; but, as it is desirable that a phenomenon should not be too rigidly named before it is known what the phenomenon is, we shall make trial for the present of the new term, 'mental suggestion.'

Richet says very happily that the courage of the scientific man consists not only in making experiments dangerous to life upon cholera, rabies, and the liquefaction of gases, but also in exposing his reputation to blemish by advocating a theory which is generally discredited. Richet has taken his courage in his hand, and has published an article in which he claims to have established a strong probability in favor of mental suggestion. We venture to believe that the careful reader will come to the conclusion that to offer such unsatisfactory experiments, so inadequately treated, was a greater strain upon his courage than the novelty of what he attempts to prove. The Society for psychical research has already established a strong presumption in favor of mental action at a distance. Richet's experiments are not to be compared with those of the society, either in the care with which they were performed or the accuracy with which they are described; and his unfamiliarity with the theory of probabilities renders his numerical deductions, except the most obvious ones, misleading and useless.

The experiments are mainly of four kinds, — guessing the suit of a card drawn at hazard from a full pack, guessing a photograph drawn at hazard from a set of six, finding a watch hidden under one of several orange-trees by means of the vibrations of a stick, and spelling out names by means of table-rappings. There is a great deal that is interesting and suggestive in these experiments, and it is a pity that they are not more convincing. It will hardly be believed that in guessing cards the author does not state whether the two persons engaged in the experiment are in contact or not. Such remarkable things are done nowadays in any parlor by muscle-reading, that no experiment in which there is contact is of the slightest weight in establishing mental suggestion. Certain precautions, the author says, are indispensable, — the cards should be a full pack; the one drawn should be returned after each trial; the person who looks at the card should abstain from every word, from every indication, however imperceptible it may be, — but he omits to say whether he is hand in hand with the person who guesses or not. Doubtless he is not; but an experiment in which so essential a circumstance as this is left to be inferred by the reader is not the kind of experiment that carries conviction with it. The conditions under which the photographs were guessed remain equally undescribed; but the remark, "It is necessary to eliminate every sign, whether in the direction of the eyes or in the expression, by which an indication can be given," makes it plain that the simple precaution of putting the performers in such a position that it should be impossible to give any indication by the expression or the direction of the eyes, was not attended to. We pass over the experiments in finding a watch hidden under orange-trees, for the reason, that, in order to attribute any weight to them, it would be necessary to know, among other things, where the person stands who has hidden the watch, and whether the one who finds it is blindfolded or not. That the experiments were performed in a garden in the environs of Paris, that the orange-trees were cultivated in boxes, and that they stood in two rows, are the only details that are given.

The last series of experiments was made by Richet and five of his friends, — friends from infancy, intelligent men, well-instructed, and not at all mystical, — two of whom are mediums. Three of these men sit at one table, — the rapping-table, — and two, A and B, at another. Some one thinks of a name. A moves a pencil along an alphabet which is on the table in front of him; when he reaches a certain letter, the other table, by rapping, rings a bell, and B writes down the letter indicated. In this way something like the name thought of is written down, — Jeanr for Jfard, Foqdem for Esther, Dierooreg for Cheuvreux, and, the only very good one, Cheval for Chevalon. The person who has the name in his mind *n'est ni à la table ni à l'alphabet;* but, to such a degree does Mr. Richet's talent for incomplete description pursue him, it is not said that he is standing where he cannot see the alphabet. If that is the case, the experiment is a very extraordinary one, totally different from simply divining what another person has in his mind. The medium, who sits laughing, talking, and singing with his friends, is required to give his table a vigorous shaking at the instant that two persons near him, who are thinking of the letters of the alphabet, happen to think of the same letter. Such magic as this throws even the ghosts of the English society into the shade; and the observer will need to pile Pelion upon Ossa by way of proof, before he can hope to gain credence for it.

Admitting that Richet's experiments were performed with a rigor with which they are not described, his estimation of the improbability of their results arising by chance falls far short of the truth. He says, after combining the results of all his experiments, — those made with mediums, with 'sensitives,' and with the non-hypnotizable, — that the probability in favor of mental suggestion may be represented by $\frac{3}{4}$. This number is the ratio of the difference between the actual number and the probable number of successes to the whole number of trials. But a comparison of this sort affords no measure of the improbability of the observed facts being the result of chance. It is not the deviation from an average, but the probability that a given deviation should arise, that gives the value of the evidence in favor of the operation of a cause. Richet does not seem to know that there is a mathematical formula by which this probability is determined. For instance: in three series of experiments in guess-

ing cards, he made, in all, 2,927 trials, and obtained 789 successes instead of 732, which is the number that chance alone would lead him to expect. The probability that the actual number of successes shall differ from the probable number in either direction by so much as 57 in 2,927 trials (by λ in s trials, say) is approximately, —

$$1 - \frac{2}{\sqrt{\pi}} \int_0^{\lambda \sqrt{2pqs}} e^{-t^2} dt,$$

which gives in the present case $\frac{1}{70}$; that is to say, there is in reality one chance in seventy of so great a deviation arising by accident, while Richet would make it fifty in fifty-one.

We repeat that many of Mr. Richet's experiments are interesting, and the results very striking. It is a pity that they are not more effective than they are in placing the question of mental suggestion upon a scientific basis. Christine Ladd Franklin.

THE DIMENSIONS OF SHIPS.

I have often thought, that, in practising the art of ship-building, men have too much neglected the study of the forms of the fish which make the waters their permanent habitation, and are designed for the most part to attain the highest degree of velocity in the pursuit of their prey. No doubt, the case of a ship partly, and that of a fish wholly, immersed, are not strictly parallel; but they offer very many points for comparison of which we may avail ourselves.

A fish makes use of its tail-fin as the chief and nearly sole instrument of propulsion; and, in the adoption of the screw-propeller in preference to the old side-wheels, the steamers of the present day have secured a great advantage over the old forms. In the proportion of length to those of breadth and depth, however, although there has of late been some improvement, there would appear to be a lingering tendency to hold by the old mistaken idea that a ship was rather to be regarded as a wedge to cut the water than as occupying the space of a wave of displacement; and so we have ships nine, ten, or even eleven times as long as broad, and twenty times the length that they have draught. Now, knowing as we do the magnitude of the skin-resistance in ships, and its smallness in the oily coats of fishes, one would expect that the length of the latter would be greater proportionally than that of the former, if ships were built in the proper form to secure a high velocity. But what is the fact? On an average of sixteen fresh-water fish delineated in Daniell, I find that the extreme length, inclusive of the tail-fin, is four and twenty-two hundredths times that of the extreme depth exclusive of the dorsal and ventral fins. The average breadth will be perhaps one-half of the depth, making the proportion to length about 1:8.

Abstract of a paper by Dr. J. P. Joule, published in the Proceedings of the Manchester literary and philosophical society.

On an average of three species of whale, the narwhal, Greenland shark, dolphin, and the porpoise, I find from Scoresby and other authorities the proportion of either depth or breadth to length to be about 1:4.7, they having nearly circular sections. Therefore it appears, that, while in ships the proportion of length to width of midship immersion is 5:1, that of the shark, the porpoise, or dolphin, is not more than 1.5:1.

Dr. Scoresby, in his 'Arctic regions,' gives twelve miles per hour as the utmost speed of the whale; but Mr. Baxendell gives it a velocity approaching twenty miles. I had an opportunity of witnessing the wonderful swimming-powers of the porpoise during a voyage to the Clyde in the Owl steamer on the 29th of June last. About eight A.M., the sea being calm near the Mull of Galloway, we were beset by a shoal of these animals, which raced with the ship, and kept alongside for three or four minutes with the greatest ease. They swam in twos and threes, at a foot or two distant from one another, several approaching within ten feet of the vessel, which was steaming at the rate of thirteen and four-tenths statute miles per hour. If such a velocity can be maintained by the porpoise, with its comparatively bluff figure-head, we may surely expect a much higher velocity in the case of fish more obviously designed for speed.

My son tells me that in a voyage of the Malvina from Leith to London he had observed at night two fishes of about a yard long which kept for a considerable time in advance of the cutwater of the ship, being visible by their phosphorescent light. The ship was at the time steaming at the rate of fifteen and two-tenths statute miles per hour.

The investigation of the resistance of solids moving in fluids has been taken up theoretically by Thomson, Stokes, Rankine, and practically by Froude, who has found that the surface friction in long iron ships is more than fifty-eight per cent of the whole. Froude recognized the study of the forms of animal life in guiding us to practical conclusions.

From the above considerations, I am inclined to believe that a length of not more than five to one of breadth would be better than the extreme proportions of ships now in vogue, and that the greatest breadth should be considerably in advance of the midship.

RECENT TRAVELS IN ARABIA.

From the recently printed account of Mr. Charles Huber's mission in Arabia we cull some notes of general interest.

On an excursion to the great mountain Jebel Aga, the party camped at the entrance of the Tuarin valley, near the ruins of the little fortress El Asfar. Three palms grow here; and there is a little spring whose temperature, 75° F., indicates the heat of the soil and rock in this arid region. Around the ruins were traces of cultivation and abandoned wells. At a short distance the traveller was fortunate enough

to make the second known discovery of Himiarite inscriptions, of which there were nine. These were on a block of granite of enormous size, under whose shade travellers have refreshed themselves for many centuries, as these inscriptions, supposed to be more than two thousand years old, sufficiently indicate. They are accompanied by rude outlines of horsemen brandishing the sword and lance, precisely similar to sketches made in Huber's note-book by a living Arab chief at Haïl. It is probable that the first Himiarites established themselves in the Tuarin valley on their southward migration. In the numerous revolutions which have devastated Arabia, it is probable that the valley has been many times depopulated.

Farther on, the party passed a singular rock, which, in falling from the crag, had perched itself on a granite mass by three sharp points. Being somewhat concave below, it resounds like a rather heavy bell to the strokes of a cane, — an infallible sign, according to the Arabs, of concealed treasures. Their camp, a few miles beyond, was in the midst of a remarkable ravine of a uniform width of about fifteen hundred feet, bordered by granite walls about nine hundred feet in height, presenting in the sun remarkable hues of red, violet, brown, and rose. The perfectly level sandy soil was of a peculiar rose color, and the impression conveyed was of a gigantic street newly swept and silent. Access to the Gou valley was obtained through a very narrow ravine encumbered with fallen blocks, hardly affording passage for a camel. Above this it enlarges into a circular plateau continued on the other side by a long boulevard of magnificent palms. The spot seemed a terrestrial paradise. Flocks of birds, so rare in this parched land, delighted the eye, and their songs broke the silence of the desert in a delightful manner. Vegetation was luxuriant and beautiful; and a flowing spring refreshed the party, though its temperature was not less than 82° F.

In travelling about the Jebel Aga, ascent was found practicable only in a very few places. The walls rise abruptly without foot-hills, and are of a gray, red, or reddish-brown granite of coarse grain composed of quartz, with large crystals of red and white felspar with grains of pegmatite. The dip of the beds is about 55° toward the horizon. The wind in this part of Arabia blows always from the west.

The road passing through the region of Jebel Selma, at no great distance from the Jebel Aga, traverses an isolated volcanic district, where the passage is often only wide enough for single file. Several craters, one twenty-five hundred feet across, still remain, and, though now safe for travellers, were formerly the fastnesses of Arab robbers, whose attacks made the region deserve, even more than its natural character, its Arabian name of Gehenna. Beyond, just where the grits replace the basaltic rocks, lies the little town of Feyd, containing some forty houses. Anciently this was a site of renown, for whose determination Ritter vainly spent many pages of discussion; but its splendor has departed. Around it, at no great distance, are scattered low hills of volcanic origin, in some of which the craters are still evident. Water lies under a bed of basalt, very hard, and six or seven feet thick, covered with about thirty feet of sand and gravel. The wells, singularly enough, are connected by subterranean tunnels. This water, accessible only at the cost of so much labor, must be raised to water the palm-trees, and is reported to be gradually diminishing, to which the decay of the ancient city is probably due. The desert around Feyd is called Aba-el-Krûs.

Thence toward El Kehafah the path traverses a region of volcanic rock, which emerges from the surface on either hand in a singular manner. It looks as if the whole region had been once a boiling liquid lava which had been suddenly congealed, leaving solidified bubbles twenty-five to thirty-five feet in diameter, which appear at every step. A little sand is found here and there in crevices, with an occasional shrub growing in it; but apart from this, the desert is absolutely naked rock of indescribable desolation, — a corner of the real Arabia Petraea. The name of this waste is El Sarâfah. In this region, according to the Arabs, there are some ten rainy days at the beginning of winter: the rest of the year is literally dry. Beyond Kehafah several small oases were seen of a singular geological structure, which is, however, common in the region. They consist of elliptical dish-like depressions, dipping slightly toward the north, their axes north-west and south-east, and about twenty-four kilometres in length by half as much in width. The margins of these basins are abruptly elevated, rocky walls, about thirty or forty feet in height. The wells pass through twelve or fifteen feet of gravel and rock, beneath which is water in abundance, but too bitter to be potable. Drinking-water is accessible in but two or three places. The road from Kehafah to 'Ayoun passes the boundary of the safe country, and enters the region of robber nomads. A singular rock, much resembling the sphinx in form, partly covered with illegible Himiarite and Arabic inscriptions, lies isolated near the route, and beyond a much smaller one, from which a few inscriptions could be transcribed. The inhabitants of this region are small, shrivelled, and sickly-looking, in strong contrast with the fine physique of the people of El Jebel, which the traveller had left. They are violent fanatics, from whom his safe return was fortunate. The mean temperature of the soil here was 84°; and during one day, with a hot wind, the thermometer rose to 122° F. in the shade.

STEAM ON STREET-RAILWAYS.

THE HON. R. C. PARSONS recently read a paper before the British institution of civil engineers, in which the progress of steam-locomotion on street-railways was very fully considered. It was asserted that very little success had attended the efforts made to introduce steam as a motor on the common highway, while the privileges accorded by special legislation to the street-railway companies have led to comparatively great success in that direction.

The British 'Board of trade' regulations have

been amended in such manner as to protect the public, without hampering the use of steam. A special type of engine, with vertical cylinders, carried well up above the axles (to secure them from injury by mud and dust, and to make them readily accessible), and fitted with long connecting-rods, coupled directly to the leading axles, has been applied to the street-cars. All four wheels are connected by coupling-rods, as in the locomotive, and the exhaust steam is concealed by various expedients. The surface-condenser was considered more economical than superheating, to produce efficiency, and air-condensers were thought practicable. Engine and passenger-car were often combined, — a method used in various American systems, — in one of which (Rowan's) the engine can be removed, and another substituted, in a few minutes. Depreciation was allowed for at 10%. Depreciation on the line alone was taken as 3%. The cost of operation was stated at 2.28 pence per mile, while the total of all expenses was given at 9.33 pence per mile, and every penny per mile above this figure should give 2.2% in dividends. The line intended for such steam-traffic should be very substantially built, and large cars and moderate fares were advised.

Mr. Shellshear gave an account of the street-railways of Sydney, New South Wales, all of which are worked by the ordinary railway system. The number of passengers carried in 1882, on twenty-two miles of road, was 15,269,100, or about 200,000 per mile; and the earnings were over $40,000 per mile, or about 2% per mile. The gauge was 4 feet 8½ inches, and the number of motors employed was 57, including several American (Baldwin) tank-engines, which work more smoothly than the English or home-made engines. The government is having other steam-cars, on the American system, built by the Baldwin works. The result has proved that horse-traction must yield to mechanical power.

MORTILLET'S CONCLUSIONS REGARDING EARLY MAN IN EUROPE.

1. During the tertiary age, there existed a being intelligent enough to produce fire and to fabricate stone implements.

2. This being was not yet man: it was his precursor, — an ancestral form, to which I have given the name of the *man-ape*.

3. Man appeared in Europe at the beginning of the quaternary period, at least 230,000 or 240,000 years ago.

4. Our first human type was that of Neanderthal. This type, essentially autochthonous, was slowly modified and developed during the quaternary period, resulting in the type of Cro-Magnon.

5. His industry, very rudimentary at first, developed progressively in a regular manner, without shocks. This proves that the progressive movement went on upon the spot, without the intervention of propagandism and invasion from abroad. It was therefore really an autochthonous industry.

6. The regular development of this industry has enabled me to divide the quaternary period into four epochs, — first, the *chellean*, anterior to the glacial period; second, the *mousterian*, contemporaneous with it; third and fourth, the *solutrian* and the *magdalenian*, posterior to it.

7. Quaternary man, mainly a fisherman, and especially a hunter, was acquainted neither with agriculture nor with the domestication of animals.

8. He lived in peace, entirely destitute of religious ideas.

9. Towards the end of the quaternary period, in the *solutrian* and the *magdalenian* epochs, he became an artist.

10. With the present condition of things, there have come invasions from the east which have profoundly modified the population of western Europe. These have brought thither ethnic elements entirely new, and in great part brachycephalic. To the simplicity and the purity of the autochthonous dolichocephalic race, there have succeeded numerous crosses and mixtures.

11. The industry is found to be profoundly modified. Religious ideas, the domestication of animals, and agriculture have made their appearance in western Europe.

12. This first invasion, which took place at the Robenhausen epoch, set out from the regions of Asia Minor, Armenia, and the Caucasus.

PARKER'S TEXT-BOOK OF DISSECTION.

This book is well printed, and presents an attractive appearance. Of the seventy-four woodcuts, all are good, some excellent. The plan of the book is similar to that of Huxley and Martin's 'Elementary biology,' and, like it, is designed as a course of laboratory instruction. Our author deals with the anatomy of the lamprey, skate, cod, lizard, pigeon, and rabbit. It will be seen that the anatomy of a representative form of each of the vertebrate classes except the Amphibia is taken up. A type of this latter group was evidently omitted with purpose, since Huxley and Martin's 'Biology' takes up the anatomy of the frog. The anatomy of the types selected is considered from an independent point of view, and the author makes no attempt whatever to give a detailed or complete account of their structure. He dwells on the more important points, taking up the anatomy in quite as detailed a manner as desirable, and perhaps more fully than can be compassed by the student in most of our laboratories. General directions are given as to instruments, methods of dissection, and preparation, followed by more detailed instructions about dissection of the types con-

A course of instruction in zoötomy (Vertebrata). By T. Jeffery Parker, B.Sc., London professor of biology in the University of Otago, New Zealand. With seventy-four illustrations. London, *Macmillan & Co.*, 1884. 23+397 illustr. 8°.

sidered; as, for example, how and where to cut to make out the anatomy of the special parts, and their relations to one another. The directions are clear and concise, and the student will have no trouble either in dissecting or identifying the various parts. We think the introduction of clear woodcuts an important and legitimate aid to the student, and a great improvement thereby over Huxley and Martin's 'Biology.'

The book, in short, is admirably adapted for laboratory work, and furnishes to the student who will take specimens in hand, and dissect with care, a sufficient guide in making out the essential points in vertebrate anatomy.

RECENT PHYSIOLOGICAL TEXT-BOOKS.

HUTCHISON'S physiology has been before the public for some time, and apparently has met with considerable success as a school text-book. The revised edition that is now offered has but few changes. The book as a whole is commendable as a collection of facts, physiological, anatomical, and hygienic, a knowledge of which will be useful to people of all callings in life. But it is questionable whether it is a book that a thoughtful physiologist would like to see generally introduced into schools as a text-book. No chemist at the present time would wish to have an elementary text-book of chemistry merely a collection of facts or receipts, however interesting and useful such facts might be. The demand is being made in that branch of science for text-books of a higher order, which shall make the facts presented, as far as possible, illustrations of the more important general laws of chemical action. Some such reform should be attempted in elementary text-books of physiology. Physiology is worthy of being taught, in part at least, as a branch of human knowledge, or for the sake of mental training, and not simply for the purpose of preserving health, or enabling a person to conduct himself properly in case of an accident.

The remarks upon personal hygiene in the book are in the main well chosen and to the point; but, in regard to the action of alcohol, the author's prejudices, or desire to do good, have evidently biassed his statement of facts. The book contains a number of errors which should be corrected; such as, "sugar changes to fat in the body," "the acidity of the gastric juice is due to lactic acid," and the rather incomprehensible statement that albumen gives 'smoothness and swift motion' to the plasma of the blood. Another error common to both books under review is, that the proteids of the blood are spoken of as albumen and fibrine. There is no such thing as fibrine in circulating blood; and, if it is necessary to mention at all the chemical constituents of the plasma, something a little more in accord with what is actually known might be given.

Tracy's book aims to be a more scientific presentation of the facts of physiology and hygiene than is usually met with in elementary text-books; but whether the result has fulfilled the author's expectations is one of the things that might be doubted. It is scarcely scientific, for instance, to speak of alcohol as a 'rank poison,' without any qualification whatever. While such language is expected from a temperance orator, it is somewhat out of place in an elementary book supposed to give generally accepted facts. Quite enough can be said truthfully against the use of alcohol without making statements which are not borne out by the facts of physiology.

The book has some serious defects, such as the failure to say any thing at all of the function or structure of the kidneys, except in a purely incidental way. It contains also numerous errors or badly emphasized statements; such as the origin of lymph (p. 88), the action of the sympathetic nerves (p. 175), the mechanism of the reflex secretion of saliva (p. 178), the statement that all bones are at one time cartilaginous, etc. Some of the chapters — that on respiration, for instance — are well written, in clear and accurate language; and the remarks on hygiene form, probably, the best part of the book. But, as far as its physiology is concerned, the book bears evidence of having been written by one not thoroughly conversant with the subject.

A TEXT-BOOK OF PHYSICAL GEOLOGY.

THE author of this small volume has made a step in the right direction, for the plan of his book involves the wise omission of historic geology and paleontology, — subjects into whose full meaning the beginner makes but little real progress. The book would have been further improved by the omission of much of the sec-

A treatise on physiology and hygiene. By JOSEPH C. HUTCHISON, M.D., LL.D. New York, *Clark & Maynard*, 1884. Illustr. 8°.

The essentials of anatomy, physiology, and hygiene. By ROGER S. TRACY, M.D. New York, *Appleton*, 1884. Illustr. 8°.

The student's handbook of physical geology. By A. J. JUKES-BROWNE. New York, *Scribner & Welford*, 1884. 12 + 514 p., illustr. 8°.

tion on lithology, not from fault to be found with the treatment of the subject, but because lithology has now become too serious a study to be treated in so compressed a form. The student who uses this book without previous acquaintance with the rock-forming minerals that are here briefly described cannot obtain from the forty-six pages given to this section the knowledge that they are intended to give; unless, indeed, there is so liberal a supplement of personal instruction as to make the text practically unnecessary. We are familiar nowadays with the reaction against the mere verbal teaching of physics and chemistry, zoölogy and botany. The same spirit of reform should exclude brief treatment of lithology from an elementary book on physical geology. And, if the student protests that he wishes to gain at least a superficial knowledge of lithology, let the teacher confidently assure him that there is no such thing, but only a superficial ignorance. Better admit full ignorance than pretend to scanty knowledge, and use the space in the book and the time that would be given to it for fuller discussion of other subjects. The open admission of the author's own lack of expertness in modern lithology, by his acceptance of a chapter on the igneous rocks from Professor Bonney, is evidence enough that the section in question should not have been inserted in a book of this title.

The rest of the work is more satisfactory, because the elements of the subjects that it professes to teach can really be learned from it. It is characteristically British in fact and example, although some illustrations are taken from other countries. Its figures are hardly so good as they should be in this day of dry-plate photographs and easy reproduction of pen-and-ink diagrams. The chapter on earthquakes needs a good revision, and a terminology might be improved that allows such expressions as 'mass or weight,' 'ridge or mesa,' using these words apparently as synonymes. But, as a whole, the book gives brief, correct, and well-arranged mention of the more salient geological facts and theories, under the headings of 'change by internal causes;' 'surface agencies, destructive and constructive;' 'petrology and physiographic geology.' The description of the effects of faulting is exceptionally full; and unconformity, overlap, and overstep receive more than the usual share of attention. Under fluviatile agencies, Powell's expression, 'base level of erosion,' is accepted as the most fitting to describe this important and commonly neglected plane of reference; and, after definition and illustration, the author pertinently adds, that it is mainly because the early advocates of river-erosion neglected to insist on the control which elevation or depression exercised on river-action, that many observers have been unable to believe that rivers have had any significant share in the excavation of their valleys. There is to our mind an unnecessary scepticism as to the subglacial origin of bowlder-clay. The small and now old glaciers, which have long ago swept their beds so clean, afford only imperfect illustration of what went on beneath the ice-sheet just after its conquest of a land covered with the waste of secular disintegration; and there is nothing inconsistent in the belief that till was accumulated at one place, while moderate-sized lake-basins were excavated at another, as Geikie and Helland have fully shown. The localities selected for illustration are so largely English, that the book would require re-making to prepare it for American schools. We wish that some of our geologists who are broadly acquainted with the country east and west might undertake the task.

A TEXT-BOOK OF MICROSCOPICAL PETROGRAPHY.

At this time, when the interest in microscopical petrography is so steadily on the increase, the need of a concise, accurate, and recent text-book on the subject is daily becoming more apparent. That such a one does not exist in English is to be much regretted; but this very fact will cause information regarding an admirable one, which has just appeared in Germany, to prove all the more acceptable to geological students. Dr. Hussak's book is short and elementary; but it contains the results, even the most recent, which have thus far been attained by the many workers in microscopical mineralogy and lithology, stated in a clear manner.

The first part treats of methods — optical, chemical, and mechanical — which are now applied to the study of rock-constituents, as well as the general morphological properties which characterize them. Part second consists of a tabular arrangement of all the rock-forming minerals, with their characteristic microscopic appearance, chemical reactions, associations, decomposition products, and all other peculiarities which might serve in their accurate diagnosis, arranged in parallel columns. This is all given in a very small space; but the copious and excellent references furnish

Anleitung zum bestimmen der gesteinbildenden mineralien. Von Dr. Eugen Hussak. Leipzig, 1885. 196 p., 103 figs. 8°.

the student with the means of following up the literature of any subject as thoroughly as he may be inclined. The figures are numerous, new, and admirably fitted to illustrate the points for which they are intended. Altogether, the book is well suited for the wants of beginners, to whom the size and abstruseness of the larger works on petrography are often discouraging; and it will doubtless find many readers in this country as well as in Europe. It would abundantly repay translating into English.

SIMON'S MANUAL OF CHEMISTRY.

THIS book, as the preface informs us, is intended as a guide to lectures and laboratory work for beginners in chemistry, being especially adapted for the use of pharmaceutical and medical students. It is hard to see, however, in what respects pharmaceutical or medical students need special methods of treatment in their commencement of the study of chemistry before they enter upon a study of those particular branches of the science especially necessary to them in their profession.

A peculiar feature of the book is the presence of seven colored plates, showing the variously shaded colors of the more common chemicals, and their color-reactions; such as the red of mercuric iodide, the yellow of arsenious sulphide, the shades of color produced by the action of reducing-agents on a solution of potassium dichromate, etc., — a feature which can possess little value to a laboratory student, who must necessarily become familiar with these colored substances and their reactions by personal experience. The book, however, bears the appearance of being intended for students who are to have but little laboratory work; and, indeed, with the exception of the portion treating of metals and their combinations, it cannot be considered as a really good text-book for laboratory use.

There is noticeable, moreover, throughout the book, an apparent lack of connection between fact and theory. The facts are given, but the theory is lacking. When supplemented by lectures, this defect might not be so noticeable. It is, however, a point to which the student's attention needs to be constantly called. Chemistry is more than a collection of facts: it is a living science. Facts serve as a basis upon which to build theories; and the mutual connection of fact and theory needs to be constantly indicated, as well as the methods of reasoning by which the theoretical conclusions are reached.

The book, however, possesses some admirable features. As a whole, it is well written, is systematic, and contains much that is valuable. Its main defect as an elementary text-book consists in the attempt to cover too great a variety of subjects at the expense of thoroughness. Critical examination, moreover, reveals here and there an occasional incorrect or misleading statement. Thus, on p. 358 we are told that "ptyalin, the active principle of saliva, is a ferment which has the power of converting starch into glucose," whereas it has been known for the last five years that the main product of the amylolytic action of saliva is maltose. The method for the determination of nitrogen, given on p. 241, can hardly be considered as the method generally used for this purpose, as is claimed by the author; neither can the method, given on the same page, for the determination of carbon and hydrogen "by passing dry oxygen gas over the substance heated in a glass tube," be taken as a satisfactory statement of the method generally used for making a 'combustion' in oxygen gas. Again: we are told on p. 359 that pepsin, in the presence of free hydrochloric acid, does not prevent the continued action of saliva on starch, whereas it has been plainly demonstrated within the last three years that the ferment of saliva is completely destroyed by gastric juice, and even by dilute hydrochloric acid alone.

Manual of chemistry. By W. SIMON. Philadelphia, *Lea's son & Co.*, 1884. illustr. 8°.

NEW TEXT-BOOKS OF PHYSICS.

MR. GAGE states his aim to be, "to collate in this volume something of value to every teacher of physical science." The book is divided into five parts: laboratory exercises, manual of manipulation, general review of physics, test-questions, and key to solution of problems. The experiments given in the first part are mostly well enough, and some of them even of considerable ingenuity. They are, however, numbered in a minute fashion, which is likely to mislead one who reads in the announcement that there are two hundred and thirty-eight experiments. In the forty-five pages devoted to the 'manual of manipulation,' very few directions for manipulation

Physical technics, or, Teacher's manual of physical manipulation, etc. By ALFRED P. GAGE, A.M. Boston, *Author*, 1884. 200 p. 8°.

Problèmes de physique de mécanique, de cosmographie, de chimie. Par EDME JACQUIER. Paris, *Gauthier-Villars*, 1884. 6 + 271 p. 8°.

are given, and these few are not all that could be desired. This 'manual of manipulation' is mostly given up to the discussion of such topics as 'units of mass and force,' 'inertia,' 'corpuscular theory of heat,' 'what is electricity?' etc., closing with several pages of 'odds and ends.' In short, this part is any thing but a manual of manipulation: it is rather a dumping-ground for the disconnected contents of one of the author's note-books. The test-questions and solutions to problems in the author's 'Elements of physics' fill the remainder of the little volume, and will, without doubt, be of value to those teachers who use his earlier book.

The book will prove a disappointment to most teachers. It is really a supplement to Mr. Gage's 'Physics,' but the matter which it contains should have been reserved for use in the preparation of a second edition of that work.

The 'Problèmes de physique' of Jacquier is too meagre for a text-book, too full for a mere collection of problems. It is probably intended to supplement a course of lectures. The reader who is familiar with the ordinary elementary text-books of physics will find little really new or inspiring here, but rather the old, more or less satisfactory demonstrations, without the calculus, of the laws of centrifugal force, the simple pendulum, the flow of liquids from an orifice, the foci of lenses, etc., presented as the solutions of problems. The ordinary student would find this very tedious. The part devoted to heat, with its uncompromising applications of 'binômes de dilatation,' etc., would be salutary exercise, perhaps; but it reminds one of the 'school of the soldier.' We can imagine no one but an enlisted man going through it. Of course, it would be unfair to imply that the author has in no point improved upon the work of other makers of elementary books. His second proof of the law of centrifugal force almost avoids the familiar assumption that unequal things are equal; and his page devoted to showing how the one fluid theory accounts for electric attractions and repulsions would be new and interesting to many readers.

The book concludes with a collection of a hundred and seventy-one 'problems for solution,' given without answers. These, with the exception of seventeen which deal with chemical equivalents, are of about the same character as the problems in the last edition of Everett's 'Deschanel,' and will possibly be welcomed by the weary makers of examination-papers.

NOTES AND NEWS.

Mr. Alexander Agassiz's resignation of his position as a fellow of Harvard college was naturally accepted by the corporation with great reluctance. The *Bulletin* of the university just published contains the formal votes taken at the meeting of Oct. 24, which state "that the wide range of his sympathies and interests, the confidence and affection which he inspired, and the varied information which he possessed both as a man of business and as a man of science, made his services as a fellow of singular value to the university; that his great gifts within the past thirteen years to the scientific departments, and especially to the Museum of comparative zoölogy, which amount to more than half a million of dollars, make him one of the chief benefactors of the university, and entitle him to its profound gratitude."

— The *Harvard university bulletin* for January contains a further instalment of Mr. Winsor's collation of the Kohl collection of early American maps, and the beginning (267 numbers) of another of Mr. Bliss's valuable indexes to map literature, in which the various publications of the London geographical society, together with the two principal London geographical journals, — *Ocean highways* and the *Geographical magazine*, — are treated in the same manner as he formerly indexed *Petermann's mittheilungen*. It will prove exceedingly convenient.

— The Ottawa field-naturalists' club makes a rather remarkable showing for so young a society. It has a membership of about a hundred and fifty, and an annual fee of a dollar. It has just published the fifth number of its Transactions, a pamphlet of a hundred and fifty pages, and yet has no debt. The pamphlet contains some matter of a general interest, particularly an article by Mr. W. P. Lett on the deer of the Ottawa valley, — the moose, caribou, wapiti, and Virginia deer, — and one on phosphates by Dr. G. M. Dawson.

— A course of twelve lectures on geology will be given on Thursday afternoons during February, March, and April, beginning Feb. 12, by Prof. Daniel S. Martin, at No. 58 West Fifty-fifth Street, New York. These lectures are designed especially, though not exclusively, for ladies, and are held in the building occupied by Rutgers female college.

— The Saturday lectures during February and March, under the auspices of the anthropological and biological societies of Washington, will consist of the following: Professor John Fiske, Results in England of the surrender of Cornwallis; Dr. George M. Sternberg, U.S.A., Germs and germicides; the Hon. Eugene Schuyler, The machinery of our foreign service; Mr. William T. Hornaday, Natural history and people of Borneo; Mr. Charles D. Walcott, Searching for the first forms of life; President E. M. Gallaudet, The language of signs, and the combined method of instructing deaf-mutes.

— The *Records* of the Geological survey of India, vol. xvii. part iv., contains a paper on Mr. H. B. Foote's work at the Bilba Surgam caves, in which the

existence of man in a low stage of civilization was ascertained by the discovery of a "well-made bone-gouge, and of two pieces of stag-horn, which have been cut with some sharp instrument."

—Hegnette, in the *Bulletin technologique des écoles nationales des arts et métiers*, describes a new ceramic product from the waste sands of glass-factories, which often accumulate in immense quantities, so as to occasion great embarrassment. The sand is subjected to an immense hydraulic pressure, and then baked in furnaces at a high temperature, so as to produce blocks of various forms and dimensions, of a uniform white color, which are composed of almost pure silex. The crushing-load is from three hundred and seventy to four hundred and fifty kilometres per square centimetre. The bricks, when plunged in chlorhydric and sulphuric acids, show no trace of alteration. The product has remarkable solidity and tenacity; it is not affected by the heaviest frosts or by the action of sun or rain; it resists very high temperatures, provided no flux is present; it is very light, its specific gravity being only 1.5; it is of a fine white color, which will make it sought after for many architectural effects in combination with brick or stone of other colors.

—The Royal academy of sciences of Turin gives notice that the fifth Bressa prize will be given to the scientific author or inventor, whatever be his nationality, who during the years 1883–86, according to the judgment of the academy, shall have made the most important and useful discovery, or published the most valuable work on physical and experimental science, natural history, mathematics, chemistry, physiology, and pathology, as well as geology, history, geography, and statistics. The term will be closed at the end of December, 1886. The value of the prize amounts to twelve thousand Italian lire. The prize will in no case be given to any of the national members of the academy of Turin, resident or non-resident.

—We regret to announce the death of Dr. J. Gwyn Jeffreys of Kensington, Eng., well known for his conchological researches. He died suddenly on the 24th ult. We hope in a future number to give some account of his scientific work.

— Dr. Ch. Amat has devoted some study to the Beni M'zab, —a Berber people whose territory was definitely annexed by France about two years ago, and who are described as active, sober, provident, economical, and intelligent. He remarks that the position of woman was higher among them before the introduction of Islamism. Their cemeteries, containing tombs of large worked stones, with a line of pots, plates, ostrich eggs, etc., about them, are referred to as survivals from the funeral feasts of the ancient religion. These people occupy seven towns, having a population of over thirty thousand, and are engaged in commerce.

—Capt. Poldrugo of the Austrian bark Filadelfia, from Cape Town to New York, reports an earthquake at midnight of Jan. 2, extending in an easterly and westerly direction. At the same time, he saw a large white spot on the water. He was in latitude 1° 10′ north, longitude 24° west, at the time.

—Vol. vii. No. 2, of the *American journal of mathematics*, has just appeared, and contains the following articles: 'A memoir on the Abelian and theta functions,' by Professor Cayley (this is the continuation of Professor Cayley's great memoir, the first three chapters of which appeared in vol. v. of the journal; the present article contains chapters iv.–vii., and treats principally of the case where the 'fixed curve' is a quartic both in the plane and in space); 'Solution of solvable irreducible quintic equations without the aid of a resolvent sextic,' by George Paxton Young of University college, Toronto (Professor Young assumes Jerrard's trinomial form for the quintic, finds the criterion of its solvability, and finally solves the equation in all the possible cases); a note on Maclaurin's theorem, by Hermite; the first part of a memoir on the algebra of logic, by Mr. C. S. Peirce, in which the author studies the philosophy of notation.

—No. 5 of the Izviestiya of the Russian geographical society, contains, among other things, Uspenske's account of the Island of Hainan, obtained from Chinese sources; Iwanow's report of his ascent of the Elbrus; Istomin's ethnographical journey to Archangel, and a long paper by Werestchagin on the Wotjäks. Though this Finnish people has been often discussed and described, the author gives much new and valuable information, especially in regard to mythology, feasts, and folk-lore. The closing number of vol. xii. of the Zapiski contains a long article on Korea by Otano Kigoro.

—We observe this note in a late number of the *Athenæum:* "'PARALLAX' is dead! Dr. Samuel Rowbotham used this name as the author of 'Zetetic astronomy,' and he was well known by it as a lecturer on such subjects as 'the earth not a globe.' The doctor, some years before his death, directed his 'seeking philosophy' to chemistry; but we never heard of any discovery resulting from his search."

—The supplement to the *Berliner astronomisches jahrbuch* for 1887, containing the elements and ephemerides of the small planets for the present year, is already issued, preceding, as usual, the publication of the body of the work. The best obtainable elements of the orbits of two hundred and thirty-seven of these planets are given (two hundred and forty-four was the total number known at the beginning of 1885), as also approximate ephemerides of the same, the positions being given at twenty-day intervals. Accurate ephemerides are now computed by the *Rechnungs-bureau*, and published for only nineteen small planets.

— The 'Nautical almanac' office, Washington, has lately issued a new publication; that prepared for the present year being the first, and entitled 'The Pacific coaster's nautical almanac.' It is the counterpart of the 'Atlantic coaster's almanac,' issued for the first time in 1884, and gives, in addition to astronomico-nautical data, the times of high water at San Francisco, San Diego, Astoria, and Port Townsend, in

Pacific standard time, sunrise and sunset at San Francisco, and lists of lighthouses, lighted beacons, and floating lights, on the west coast of North and South America, including the North and South Pacific islands.

— "Geonomy: creation of the continents by the ocean-currents, by J. S. Grimes (Philadelphia, 1885)," is a book characterized by implications of blindness and conservatism on the part of most physical geographers, by assertions of the great value and originality of the author's earlier works, by a broad ignorance of what others have done, and by utterly impossible physical theories. "The reason why scientic̈ians have neglected to investigate the laws of the currents thoroughly, and to discover the truth concerning them, is that they have not regarded them as of much importance. Had they suspected that the currents, by their operations, created the continents, they would long since have wrung from them all their secrets" (p. 49).

Fig. 3.

Fig. 1. Fig. 2.

AN ELECTRIC LIGHT FOR USE WITH A MICROSCOPE.

— Professor Charles Denison of Denver has prepared a series of climatic charts of the United States on the basis of the U. S. signal-service records, giving especial care to the illustration of elements of humidity and cloudiness. The dryer and moister regions of the country are thus clearly separated in a general way, as far as the scattered stations of observation will allow. The need of additional data in the west is sufficiently shown by noticing that Pike's Peak alone, of all its compeers in the mountains, is represented as having its conditions of humidity affected by its elevation. When the Cordilleras are correctly known, the broad colors now admitted will be broken up into very small patchwork. The maps are published by Rand, McNally, & Co., Chicago, and are interesting as being among the first attempts to bring the results of the signal-service records into popular use.

— *Science et nature* describes an electric lamp to be used with the microscope. All microscopists know how difficult it is to obtain good, clear light when working with high-power lenses, and any invention which will tend to lessen or overcome this difficulty will be appreciated by them. For micro-photography, Stearn's lights, illustrated in fig. 1, are decidedly the best. They measure about three centimetres in diameter, but may be made smaller. In fig. 2 there are three lights attached to a binocular, — one above the stage, for illuminating opaque objects; another below, to take the place of the reflector; and a third, much brighter, beneath all, to be used in photography. Each one can be regulated at will. It is not necessary, however, to have a microscope thus modified, for something like fig. 3 can be substituted. In this way one light can be made to serve the purposes of all. Dr. T. Stein describes in the *Zeitschrift für mikroskopie* a similar but less perfect arrangement. There is one important addition, however. In the stage beneath the object there is a spiral of platinum, which becomes heated when the current is allowed to pass through it, — an extremely convenient way of heating an object beneath the microscope.

— The geographical society of Paris awards its prizes as follows: a gold medal to Mr. de Fourcauld, for his expedition to the south of Morocco, and his studies on the western extremity of the Atlas chain; a gold medal to Dr. Neis, for his four voyages to Indo-China and into the unexplored parts of Laos; the Roquette prize to the Danish periodical, *Meddelser om Groenland*, for geological and geographical researches in Greenland; the Jomard prize to Mr. Léroux, for his work entitled "Recueil de voyages et de documents pour servir à l'histoire de la géographie, depuis le xiii^e^ siècle jusqu'à la fin du xvi^e^," published under the direction of Messrs. Scheffer, member of the institute, and Henri Cordier; the Ehrard prize to Mr. Dumas Vorzet for his charts and cartographic work.

— Mr. H. H. Johnston intends shortly to publish two works, — one on his recent experiences in eastern Africa, and the other a carefully prepared account of the Portuguese colonies of West Africa. The latter book he has had in hand since his return from the Kongo. Mr. Johnston's studies and sketches of Mount Kilimanjaro will appear shortly in the *Graphic*.